

Application No.: 10/621,399

Docket No.: 21581-00298-US1

REMARKS

Claims 1-9 and 11-20 are now in the application. The specification has been amended to recite "Comparative Example 8" in place of "Example 32" and "Comparative Example 8" to "Comparative Example 9" in Table 7. This is for purpose of consistency since Example 8 uses a catalyst in which tungsten and the third element form one compound. Claims 9 and 20 have been amended to recite "wherein the tungsten atom-containing heteropolyoxometallate anions are represented by the general formula (1):



wherein X represents a silicon atom or phosphorus atom; (n,m) are (12,40) when there is no deficiency, (11, 39) when there is one deficient structure site, (10, 36) when there are two deficient structure sites, or (9, 34) when there are three deficient structure sites, and q is a positive integer, the value of q being determined by the valence of the element X" for purposes of clarifying the meaning "tungsten atom-containing heteropolyoxometallate anions".

This amendment to the claims finds support on page 16, line 29 to page 17, line 4 of the present specification and original claim 10. In view of the amendment to claim 9, claim 10 has been cancelled.

The amendments to the claims and specification do not introduce any new matter.

The rejection of claims 9 and 20 under 35 USC 112, second paragraph has been overcome by the above amendments to claims 9 and 20. As stated above, the term "the tungsten atom-containing heteropolyoxometallate anions in the claims 9 and 20 has been amended to that represented by the general formula (1) to clarify its meaning. The anion of general formula (1) contains tungsten and other two components (Si or P, and O). This clearly points out that "tungsten atom-containing" does not exclude the presence of ingredients other than tungsten in the present invention.

With respect to the rejections of claims 1-10 and 16-20 under U.S.C. 102(b) as being anticipated by Watanabe et al (J. of Molecular Catalysis A: Chem., 145 (1999), pp. 281-289); of claims 1-7, 9-10, 17-18 and 20 under 35 USC 102(b) over Sakamoto et al (Tetrahedron Letters 41 (2000) pp. 10009-10012); of 1-5, 7-10 and 18-20 under 35 USC 102(b) over Briot et al; (J.Mater. Chem. 2000, 10, pp. 953-958); of claims 1-5, 7-10, 16 and 18-20 under 35 USC 102 (b) over Jin et al (J of Catalysis, 203, 2001, pp. 75-81); of Claims 1-5, 7-10 and 18-20 under 35 USC 102(b) over WO 98/54165 to Neumann et al; of Claims 1-7, 9-10, 16-18 and 20 under 35 USC

Application No.: 10/621,399

Docket No.: 21581-00298-US1

102 (b) over WO 94/21583 to Brown et al; and of claims 1-7, 9-10, 16-18 and 20 under 35 USC 102 (b) over WO 93/00338 to Brown et al; none of the cited references disclose or suggest a catalyst comprising a tungsten species as an essential component as supported on a porous support and further comprising a third element other than component elements of the porous support and the tungsten element as caused to co exist in the catalyst.

In the present invention, "coexist" means that the third element does not exist as the component of the catalyst compound or the porous support compound, but exists as the third element itself or as the component of the compound which is different from the catalyst compound or the porous support compound.

Claim 1-10 and 17-20 were rejected under 35 USC 102(b) as being anticipated by Watanabe et al, J. of Molecular Catalysis A: Chem., 145 (1999), pp. 281-289 (hereinafter also referred to as "Watanabe"). Watanabe fails to anticipate claims 1-10 and 17-20.

Watanabe suggests an epoxidation reaction with a heteropolyoxometallate supported on LDH. However, nothing is disclosed or suggested therein about the coexistence of the third element or improvement of the catalytic activity performance or prevention of the leaching of catalyst components into liquid reaction mixtures due to the coexistence of the third element.

Claims 1-7, 9-10, 17-18 and 20 were rejected under 35 USC 102(b) as being anticipated by Sakamoto et al, Tetrahedron Letters 41 (2000), pp. 10009-10012 (hereinafter also referred to as Sakamoto). Sakamoto fails to anticipate claims 1-7, 9-10, 17-18 and 20.

Sakamoto suggests an epoxidation reaction with a heteropolyoxometallate supported on an organic group substituted SiO₂. However, nothing is disclosed or suggested therein about the coexistence of the third element or improvement of the catalytic activity performance or prevention of the leaching of catalyst components into liquid reaction mixtures due to the coexistence of the third element.

Claims 1-5, 7-10 and 18-20 were rejected under 35 USC 102(b) as being anticipated by Briot et al, J. Mater. Chem. 2000, 10, pp. 953-958 (hereinafter also referred to as Briot). Briot fails to anticipate claims 1-5, 7-10 and 18-20.

Briot suggests an epoxidation reaction with tungsten supported on MCM-41. However, nothing is disclosed or suggested therein about the coexistence of the third element or improvement of the catalytic activity performance or prevention of the leaching of catalyst components into liquid reaction mixtures due to the coexistence of the third element coexistence.

Application No.: 10/621,399

Docket No.: 21581-00298-US1

The "Cyclooctene conversion" part in Table 2 was referred to on page 7 of the office action. However, it should be noted that in Briot, it is considered that cyclooctene conversion is high because 5 times as much hydrogen peroxide (oxidizing agent) as the alkene substrate is used in the reaction. Thus, this reaction system is chemically and economically inefficient.

Claims 1-5, 7-10 16 and 18-20 were rejected under 35 USC 102(b) as being anticipated by Jin et al, J. of Catalysis, 203, 2001, pp. 75-81. (hereinafter also referred to as Jin). Jin fails to anticipate claims 1-5, 7-10, 16 and 18-20.

Jin suggests an epoxidation reaction with tungsten supported on SiO₂. However, nothing is disclosed or suggested therein about the coexistence of the third element or improvement of the catalytic activity performance or prevention of the leaching of catalyst components into liquid reaction mixtures due to the coexistence of the third element. It is reported in Jin that a significant decrease in the activity of catalyst is observed. This is because the third element does not coexist with the catalyst.

Claims 1-5, 7-10 and 18-20 were rejected under 35 USC 102(b) as being anticipated by WO 98/54165 to Neumann et al. (herein also referred to as Neumann). Neumann does not anticipate claims 1-5, 7-10 and 18-20.

The catalyst suggested in Neumann comprises tungsten and zinc as the component of one compound. This is quite different from the "coexist" form of the catalyst in the present invention. In addition, the active site of the catalyst in Neumann is ruthenium; whereas, the active site of the catalyst of the present invention is tungsten. Also, Neumann fails to disclose calcination of the catalyst.

Claims 1-7, 9-10, 16-18 and 20 were rejected under 35 USC 102(b) as being anticipated by WO 94/21583 to Brown et al. (hereinafter referred to as Brown).

Brown fails to anticipate claims 1-7, 9-10, 16-18 and 20. Brown suggests an epoxidation reaction with tungsten supported on the support. However, nothing is disclosed or suggested therein about the coexistence of the third element or improvement of the catalytic activity performance or prevention of the leaching of catalyst components into liquid reaction mixtures due to the coexistence of the third element.

Claims 1-7, 9-10, 16-18 and 20 were rejected under 35 USC 102(b) as being anticipated by WO 93/00338 to Brown et al. (hereinafter referred to as Brown).

Application No.: 10/621,399

Docket No.: 21581-00298-US1

Brown suggests an epoxidation reaction with tungsten supported on the support. However, nothing is disclosed or suggested therein about as coexistence of the third element or improvement of the catalytic activity performance or prevention of the leaching of catalyst components into liquid reaction mixtures due to the coexistence of the third element.

The cited references fail to anticipate the present invention. In particular, anticipation requires the disclosure, in a prior art reference, of each and every recitation as set forth in the claims. See *Titanium Metals Corp. v. Banner*, 227 USPQ 773 (Fed. Cir. 1985), *Orthokinetics, Inc. v. Safety Travel Chairs, Inc.*, 1 USPQ2d 1081 (Fed. Cir. 1986), and *Akzo N.V. v. U.S. International Trade Commissioner*, 1 USPQ2d 1241 (Fed. Cir. 1986).

There must be no difference between the claimed invention and reference disclosure for an anticipation rejection under 35 U.S.C. 102. See *Scripps Clinic and Research Foundation v. Genetech, Inc.*, 18 USPQ2d 1001 (CAFC 1991) and *Studiengesellschaft Kohle GmbH v. Dart Industries*, 220 USPQ 841 (CAFC 1984).

Claims 1-10 and 16-20 were rejected under 35 USC 103 (a) as being obvious over Briot et al., J. Mater. Chem. 2000, 10, p. 953-958 in view of WO 98/54165 to Neumann et al.

The cited references fail to render obvious claims 1-10 and 16-20. In particular, as discussed above, the cited references disclosed nothing specifically with respect to the coexistence of the third element with the tungsten species supported on the porous support, nor does it focus on the importance of such aspect.

The present invention is achieved by optimization of the catalyst used in the liquid phase oxidation reaction, and shows superior results and unexpected advantages as compared to the prior art such as effectiveness in improving or maintaining the catalytic activity performance and, further, in preventing the catalyst component tungsten species from being leached into liquid reaction mixtures, with the result that the catalysts can be prevented from decreasing in catalytic activity and therefore can be reused to a greater extent.

Therefore, it would not have been obvious to the skilled artisan in the art to reach to the present invention from the disclosure of the cited references, which fail to disclose the coexistence of the third element.

Briot and Neumann et al. lack the necessary direction or incentive to those of ordinary skill in the art to render a rejection under 35 USC 103 sustainable. The cited art fails to provide the degree of predictability of success of achieving the properties attainable by the present

Application No.: 10/621,399

Docket No.: 21581-00298-US1

invention needed to sustain a rejection under 35 USC 103. See *Diversitech Corp. v. Century Steps, Inc.* 7 USPQ2d 1315 (Fed. Cir. 1988), *In re Mercier*, 187 USPQ 774 (CCPA 1975) and *In re Naylor*, 152 USPQ 106 (CCPA 1966).

Moreover, the properties of the subject matter and improvements which are inherent in the claimed subject matter and disclosed in the specification are to be considered when evaluating the question of obviousness under 35 USC 103. See *Gillette Co. v. S.C. Johnson & Son, Inc.*, 16 USPQ2d. 1923 (Fed. Cir. 1990), *In re Antonie*, 195, USPQ 6 (CCPA 1977), *In re Estes*, 164 USPQ 519 (CCPA 1970), and *In re Papesch*, 137 USPQ 43 (CCPA 1963).

No property can be ignored in determining patentability and comparing the claimed invention to the cited art. Along these lines, see *In re Papesch*, supra, *In re Burt et al*, 148 USPQ 548 (CCPA 1966), *In re Ward*, 141 USPQ 227 (CCPA 1964), and *In re Cescon*, 177 USPQ 264 (CCPA 1973).

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. According, the Examiner is respectfully requested to pass this application to issue.

In the event the Examiner believes an interview might serve to advance the prosecution of this application in any way, the undersigned attorney is available at the telephone number noted below.

Applicant believes no fee is due with this response. However, if a fee is due, please charge our Deposit Account No. 22-0185, from which the undersigned is authorized to draw.

Dated: June 29, 2006

Respectfully submitted,

By 

Burton A. Amernick

Registration No.: 24,852
CONNOLLY BOVE LODGE & HUTZ LLP
1990 M Street, N.W., Suite 800
Washington, DC 20036-3425
(202) 331-7111
(202) 293-6229 (Fax)
Attorney for Applicant